



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: V2531-E5 BYPASS RATIO (-): 4.5
 UNIQUE ID NUMBER: 01P14IA026 PRESSURE RATIO π_{co} (-): 32.3
 COMBUSTOR: Floatwall
 ENGINE TYPE: MTF RATED OUTPUT F_{co} (kN): 134.8

REGULATORY DATA

CHARACTERISTIC VALUES:	LTO_{mass}/F_{co} (mg/kN)	LTO_{num}/F_{co} (particles/kN)	NVPM MASS CONCENTRATION ($\mu\text{g}/\text{m}^3$)
LTO/F_{co} AND MAX nvPM _{mass}	817.3	7.52E+15	1766
AS % OF CAEP/10 LIMIT	-	-	30.9
AS % OF CAEP/11 LIMIT (InP)	46.7	65.3	
AS % OF CAEP/11 LIMIT (NT)	255.5	187.4	

MEASURED DATA

MODE	POWER SETTING (% F_{co})	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM _{mass} ($\mu\text{g}/\text{m}^3$)
				EI _{mass} (mg/kg)	EI _{num} (particles/kg)	
TAKE-OFF	100	0.7	1.329	108.3	3.30E+14	
CLIMB OUT	85	2.2	1.079	206.5	9.43E+14	
APPROACH	30	4.0	0.391	326.2	2.75E+15	
IDLE	7	26.0	0.144	58.5	1.41E+15	
LTO TOTAL (kg, mg, number of particles)			517	79238	7.29E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/F_{co} VALUES (mg/kN, particles/kN)				587.9	5.41E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$)				450.4	2.87E+15	1372

* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (% F_{co})	CORRECTED EMISSIONS INDICES	
		EI _{mass_SL} (mg/kg)	EI _{num_SL} (particles/kg)
TAKE-OFF	100	120.6	7.10E+14
CLIMB OUT	85	234.4	2.26E+15
APPROACH	30	387.0	7.99E+15
IDLE	7	79.3	6.34E+15

AMBIENT CONDITIONS

	From		To	
	BAROMETER (kPa)	100.9	101.6	HEAT OF COMBUSTION (MJ/kg)
TEMPERATURE (K)	275.8	278.2	HYDROGEN CONTENT (%mass)	13.83
HUMIDITY (kg water/kg dry air)	0.0018	0.0025	AROMATICS CONTENT (%vol)	16.6
			NAPHTHALENE CONTENT (%vol)	2.38
			SULPHUR CONTENT (ppm by mass)	540

MANUFACTURER: International Aero Engines
 TEST ORGANIZATION: Pratt & Whitney
 TEST LOCATION: East Hartford, CT
 TEST DATES: 12/12/2016-14/12/2016

REMARKS

1. Data from certification report IAE-0324
2. Engine performance reflects SelectOneTM and SelectTwoTM package upgrades
3. nvPM levels in accordance with Annex 16 Vol. II, Chapter 4, Appendix 7 and Appendix 8.